

HOW I DO IT:

Adjuvant Hepatic Arterial Infusion Chemotherapy for Gastrointestinal Malignancies with Removable Hepatoarterial Catheter

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INTRODUCTION

Hepatic metastases are a major cause of mortality in patients with gastrointestinal cancers, especially with colorectal carcinomas. The rationale for hepatic arterial chemotherapy has been established on anatomical and pharmacological bases for primary and metastatic hepatic cancers [1]. To control micrometastases in the liver, hepatic arterial infusion of anticancer agents could be effective [2,3]. We had the idea that adjuvant continuous hepatoarterial infusion with 5FU could decrease the mortality for colorectal cancer patients at high risk of developing liver metastases. After the curative resection of colorectal cancers, we tried continuous hepatoarterial infusion with 5FU for 2 weeks following the operation and subsequent systemic chemotherapy as adjuvant therapy. So far, the hepatoarterial catheter that was inserted from the gastroduodenal artery could not be removed once the catheter was in place. For this protocol, we innovated the removable hepatoarterial catheter, which was placed during the colorectal operation. This technique made it possible to remove the catheter without bleeding after continuous infusion of 5FU for 2 weeks by just pulling the catheter out.

TECHNIQUE

The procedure of placing the hepatoarterial catheter follows the resection of gastrointestinal malignancy and reconstruction. Prior to the operation, one should ascertain by means of hepatoarterial 3D CT or angiogram that no anatomical anomalies of the hepatic arterial system are present. The hepatoduodenal ligament above the upper border of the first portion of the duodenum is incised and the bifurcation of the common hepatic artery and gastroduodenal artery is exposed about 2 cm in length. The right gastric artery, which arises at the bifurcation of

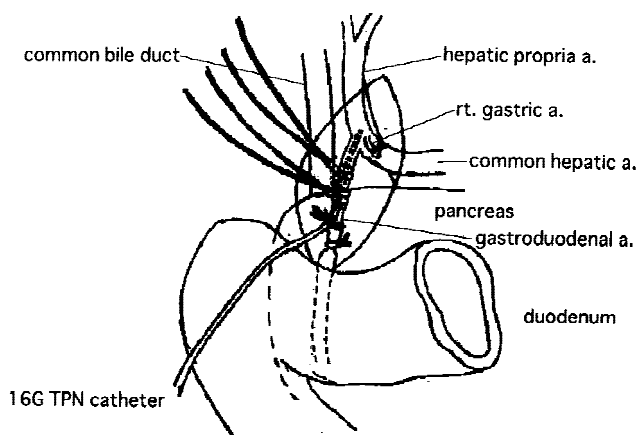


Fig. 1. Illustration of removable hepatoarterial catheter inserted from the gastroduodenal artery. The tip of it is located in the common hepatic artery.

the common hepatic artery, is ligated to prevent ulcer development by anti-tumor drugs. The gastroduodenal artery is dissected free and ligated at a point 2 cm from its origin. During the procedure, one or two small branches that arise from the gastroduodenal artery and supply the pancreas are ligated. A 16G 30 cm total parenteral nutrition (TPN) catheter is inserted into the gastroduodenal artery from the small opening, with its tip reaching up to the bifurcation of the common hepatic artery (Fig.1). The gastroduodenal artery and the inserted catheter are ligated together at two points with a double

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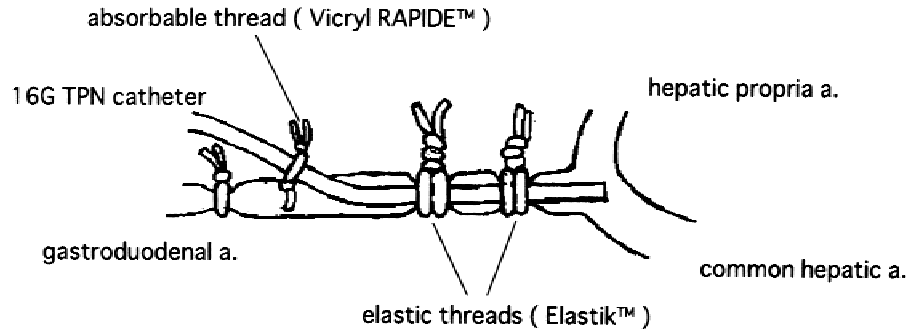


Fig. 2. Schema of removable hepatoarterial catheter with special elastic rubber bands and rapidly absorbable suture.

loop of elastic rubber bands, Elastik™; Matsuda Suture, Inc., Tokyo, Japan) (Fig. 2). The catheter is fixed at the point of insertion with Vicryl RAPIDE™ (ETHICON, Inc., Somerville, NJ) (4-0), which can be absorbed within 2 weeks to prevent dislocation of the catheter (Fig. 2).

After the operation, 5FU is continuously infused from the catheter for 2 weeks. The catheter is removed after the chemotherapy is complete by pulling it out.

OUTCOME

The authors applied this technique to 6 patients who suffered from advanced colonic cancers. We identified no complications from this catheter and no bleeding at the time of removal. This technique could be applied not only to colorectal cancer but also to other gastrointestinal malignancies with potential hepatic metastases.

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COMMENTARY

The authors have described the successful use of rubber bands to tie around the proximal portion of the gastroduodenal artery containing an infusion catheter for regional chemotherapy to the liver. Actually, the concept of using a rubber band to tie around the gastroduodenal artery is not entirely new. We described it in 1979 [1] and in a monograph later in 1985 [2]. However, we employed

a silk tie around the portion of gastroduodenal artery containing the catheter, and tied it while normal saline was being infused from a plastic bag (ordinarily employed for intravenous infusion) with a blood pressure cuff around the bag inflated at mean arterial pressure so that the tie would not be too tight thus partially obstructing the catheter. We then applied the rubber band and tied it in the hope that in the case of accidental pull out of the intra-arterial catheter the rubber band would contract and obliterate the lumen of the gastroduodenal artery thus preventing bleeding. In our cases, the catheter was pulled out (with difficulty by applying constant traction with weights) several months later after several courses of chemotherapy, and we encountered no bleeding.

The authors, however, deserve credit for the description of this technique because 1) they used only rubber bands around the gastroduodenal artery and an absorbable suture, and 2) they proved the point that the band will contract and prevent bleeding in the early postoperative period when the catheter is removed.

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